

# PATENT SPECIFICATION

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## (54) REUSABLE SLIDING CLASP FASTENER WITH EMERGENCY OPENING MEANS

(71) We, YOSHIDA KOGYO K. K. of No. 1, Kanda Izumi-cho, Chiyoda-ku, Tokyo, Japan, a Japanese Corporation, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention relates generally to sliding clasp fasteners, and in particular to a sliding clasp fastener having emergency opening means such that the fastener is normally opened or closed by a slider moving along interlockable rows of fastener elements or scoops but, in an emergency, can be forced open from its midpoint without manipulating the slider. The sliding clasp fastener of this character finds the most advantageous use on entrances of camping tents and like closure openings of other articles.

The sliding clasp fastener of the type under consideration, as heretofore constructed, typically comprises an emergency opening zone disposed in a suitable position intermediate both ends of interchangeable rows of fastener elements, and top and bottom stop assemblies to limit the movement of a slider along the fastener elements. When the fastener is forced open from the emergency opening zone in an emergency such as a fire or earthquake, the slider is located in its fully closed position on the rows of fastener elements, where the slider is in contact with the top stop assembly. If this slider could be smoothly pulled down to the bottom stop assembly along the rows of fastener elements, the sliding clasp fastener would be reusable because then it can be opened and closed by the slider in the usual manner.

In reality, however, the rows of fastener elements are thoroughly disengaged from each other after the sliding clasp fastener has been forced open in an emergency, so that the slider can hardly be pulled down

therealong to its lowermost position. If the slider is somehow managed to move down along the disengaged rows of fastener elements, its movement will be completely blocked as it approaches the bottom stop assembly, since then the element row portions lying between the slider and bottom stop assembly will bulge so as to form an elliptical spacing therebetween.

As the slider cannot be pulled down to its endmost position after the emergency opening of the fastener, it is impossible to open and close the fastener throughout its length. The forced downward movement of the slider is also easy to cause irregularities in the pitch of the fastener elements or the dislodgement of the elements. For these reasons the sliding clasp fastener that has been forced open in an emergency has heretofore been considered not restorable to its normal use.

The present invention seeks to provide a sliding clasp fastener which can be readily forced open in an emergency without manipulating a slider and which, after having been forced open, can be restored to an operable state through a simple procedure.

According to the invention, there is provided a sliding clasp fastener comprising a pair of stringers having interchangeable rows of fastener elements carried thereby, said rows of fastener elements having an emergency opening zone which is located intermediate both ends thereof and which is adapted to permit the sliding clasp fastener to be forced open in emergencies without pulling a slider along the rows of fastener elements, and a slider escape mechanism at one end of the sliding clasp fastener for permitting the slider to ride on only one of the stringers while releasing the other stringer after the sliding clasp fastener has been forced open from the emergency opening zone, and a connect-

that the slider can hardly be pulled down

disconnect terminal mechanism at the other end of the sliding clasp fastener for connecting and disconnecting the stringers while the rows of fastener elements are disengaged from each other.

After the sliding clasp fastener has been forced open from the emergency opening zone in an emergency, its stringers are temporarily completely separated from each other, with the slider riding on one of the stringers at one end thereof. The slider is then pulled down to the other end of the stringer along the row of fastener elements carried thereby, and the two stringers are reconnected by the connect-disconnect terminal mechanism at the said other end of the fastener. The slider is now movable along the rows of fastener elements to engage or disengage the same in the usual manner.

It should be appreciated that no undue stress is exerted on the fastener elements during the foregoing process of fastener restoration. The sliding clasp fastener according to the invention thus lends itself to continued use in good working order.

The invention will be described by way of example with reference to the accompanying drawings in which like reference characters refer to like parts throughout, and wherein:

Figure 1 is a plan view of a preferred clasp fastener embodying this invention, the sliding clasp fastener being shown closed;

Figure 2 is a similar view showing the sliding clasp fastener forced open in an emergency;

Figure 3 is also a similar view showing the sliding clasp fastener with its slider guided onto one of the fastener stringers after the emergency opening of the fastener; and

Figure 4 is a fragmentary plan view explanatory of the way the two fastener stringers are reconnected after having been temporarily separated from each other.

With particular reference to Figure 1 the invention is therein shown embodied in a sliding clasp fastener having a pair of completely separable fastener stringers 10 and 11 which include tapes 12 and 12' along the opposed inner edges of which there are arranged interchangeable rows of fastener elements or scoops 13 and 13' of the well known discrete type. The illustrated sliding clasp fastener broadly comprises an emergency opening zone 14 located intermediate both ends of the rows of fastener elements 13 and 13', a slider escape mechanism 15 arranged at or adjacent one end of the sliding clasp fastener, and a connect-disconnect terminal mechanism 16 at the other end of the fastener.

The emergency opening zone 14 is such that the rows of fastener elements 13 and 13' are made incapable of interlocking

engagement in that zone when the fastener is closed by a slider 17 movable therealong. In this particular embodiment of the invention the emergency opening zone 14 is formed by removing several fastener elements from each stringer tape. Alternatively, the emergency opening zone may be formed by completely or partly removing the coupling heads of the several fastener elements on each stringer tape so that these elements may be essentially incapable of interengagement when the fastener is closed.

If desired, a pair of reinforcements 18 of suitably rigid material may be fixedly arranged along, and on the opposite sides of, the emergency opening zone 14. These reinforcements should be longer than the emergency opening zone and extend beyond both extremities of the zone. In this manner the sliding clasp fastener will not open accidentally from the zone in spite of a transverse pull which may be exerted on the stringer tapes 12 and 12' in the normal use of the fastener.

The slider escape mechanism 15 is designed to permit the slider 17 to escape from the interengageable rows of fastener elements 13 and 13' and to ride on only the stringer 10 after the sliding clasp fastener has been forced open in an emergency. To this end the slider escape mechanism comprises a pair of yieldable stops 19 and 20 mounted on the respective rows of fastener elements 13 and 13', and an extra length of fastener elements 21 carried by the stringer 10 as an upward extension of the elements 21 carried by the stringer 10 as an upward extension of the elements 13.

Normally, the yieldable stops 19 and 20 should function to limit the upward or fastener closing movement of the slider 17 along the rows of fastener elements 13 and 13'. When the slider 17 in its fully closed position is further forcibly pulled upwardly, however, the yieldable stops 19 and 20 should cooperate to permit the slider to travel therepast and to ride onto the extra length of fastener elements 21 on the stringer 10.

In this particular embodiment the stop 19 is shown to have a resilient wall portion 22, whereas the other stop 20 is shown to have a projection 23 for abutting contact with the lower edge of the stop 19 and a convexity 24 to be pressed against the resilient wall portion 22 of the stop 19. Thus, when the slider 17 is moved upwardly along the rows of fastener elements 13 and 13' to its fully closed position thereon in the normal use of the fastener, the projection 23 of the stop 20 will abut against the lower edge of the stop 19 to limit the fastener closing movement of the slider.

If then the slider 17 is further forcibly

5 pulled upwardly, the resilient wall portion 22 of the stop 19 will deform under pressure from the convexity 24 of the stop 20 within the body of the slider. The slider 17 will thus travel past the pair of yieldable stops 19 and 20 and ride onto the extra length of fastener elements 21 on the stringer 12, as then the other stringer 11 is released from the slider.

10 The connect-disconnect terminal mechanism 16 at the other or bottom end of the sliding clasp fastener is designed to connect and disconnect the pair of stringers 10 and 11 as required while the rows of fastener elements 13 and 13' are disengaged from each other. In one form of construction this mechanism 16 takes the form of the known box-and-pin separable coupling which comprises a box component 25 and pin component 26, as illustrated in Figure 1.

20 The mode of use of the sliding clasp fastener of the foregoing construction will now be described with reference to Figures 2, 3 and 4. In order to open the fastener in the event of a fire or other emergencies, a pressure may be applied to its emergency opening zone 14 so as to cause partial disengagement of the fastener elements 13 and 13' adjacent the zone. By then spreading the stringers 10 and 11 apart from each other, the fastener can be opened without pulling the slider along the rows of fastener elements, as will be seen from Figure 2.

35 The sliding clasp fastener which has been thus forced open in an emergency can be restored to its normal operable state by the following procedure. With reference to Figure 3 the slider 17 is first forcibly pulled upwardly past the pair of yieldable stops 19 and 20 and is thus caused to escape from the interengageable rows of fastener elements 13 and 13' and to ride onto the extra length of fastener elements 21 on the stringer 10.

45 The rows of fastener elements 13 and 13' may then be completely disengaged at their lower portion, if necessary, and the pin component 26 of the connect-disconnect

terminal mechanism 16 may be pulled out of the box component 25. The stringers 10 and 11 are now completely separated from each other.

Succeedingly, as illustrated in Figure 4, the slider 17 may be pulled down from the extra length of fastener elements 21 along the row of elements 13 into abutting contact with the box component 25. The pin component 26 can now be inserted into the box component 25 through the slider 17 to reconnect the pair of stringers 10 and 11 at their bottom ends. The sliding clasp fastener will be closed in the normal manner as the slider 17 is then pulled upwardly along the interengageable rows of fastener elements 13 and 13'.

#### WHAT WE CLAIM IS:—

1. A sliding clasp fastener comprising a pair of stringers having interengageable rows of fastener elements carried thereby, said rows of fastener elements having an emergency opening zone which is located intermediate both ends thereof and which is adapted to permit the sliding clasp fastener to be forced open in emergencies without pulling a slider along the rows of fastener elements, and a slider escape mechanism at one end of the sliding clasp fastener for permitting the slider to ride on only one of the stringers while releasing the other stringer after the sliding clasp fastener has been forced open from the emergency opening zone, and a connect-disconnect terminal mechanism at the other end of the sliding clasp fastener for connecting and disconnecting the stringers while the rows of fastener elements are disengaged from each other.

2. A sliding clasp fastener substantially as herein described with reference to and as illustrated in the accompanying drawings.

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FIG. 1

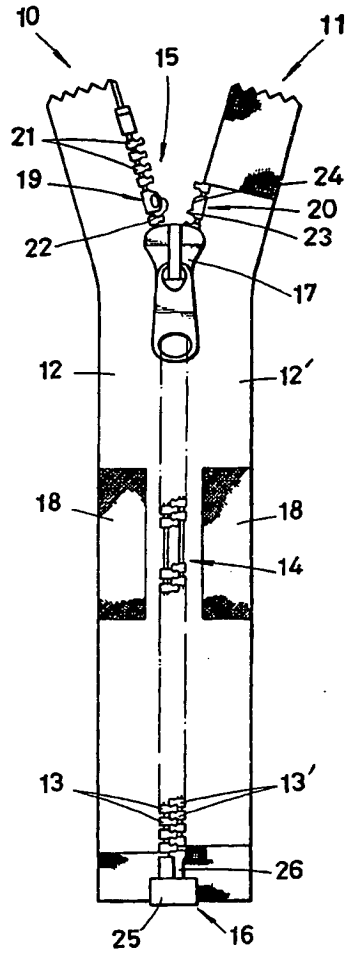


FIG. 2

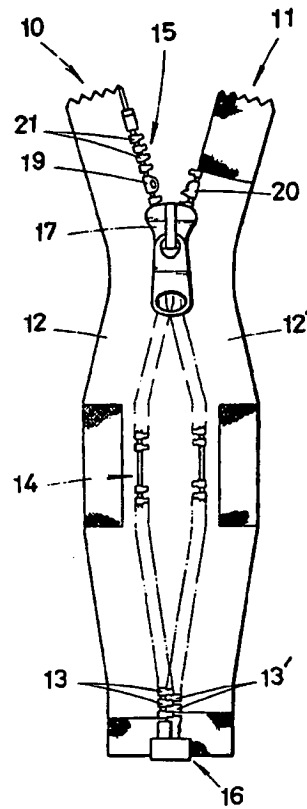


FIG. 3

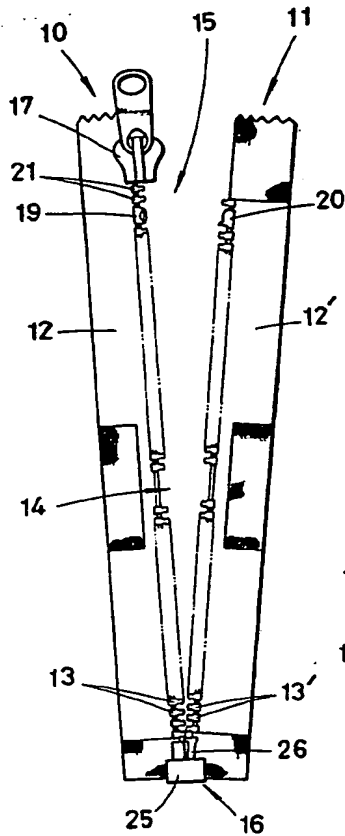
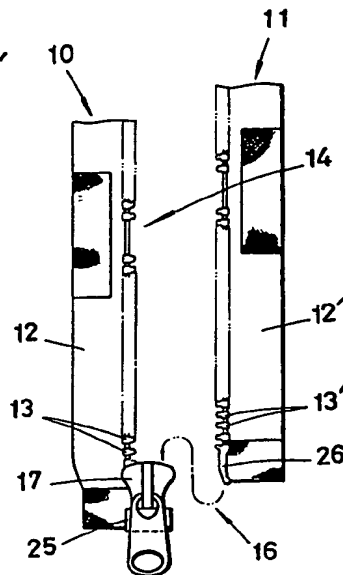
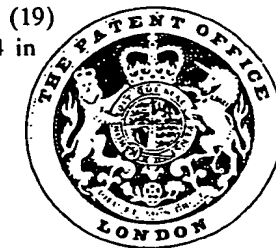


FIG. 4





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(54) SLIDING CLASP FASTENER WITH  
 EMERGENCY OPENING MEANS

(71) We, YOSHIDA KOGYO K.K. of No. 1, Kanda Izumicho, Chiyoda-ku, Tokyo, Japan, a Japanese Corporation do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be particularly described in and by the following statement:-

This invention relates generally to sliding clasp fasteners and is more specifically directed to improvements in or relating to a sliding clasp fastener of the type having an emergency opening zone at its intermediate point such that, in an emergency, the fastener can be manually forced open from the zone without need for pulling the slider along the interlocking rows of fastener elements or scoops.

The sliding clasp fasteners of the above described type find advantageous use with emergency exits or other closure openings in tents, curtains and like articles. In the event of an emergency such as a fire or earthquake, a finger pressure is to be applied to the emergency opening zone located intermediate both ends of the interlocking rows of scoops, and the fastener is readily openable from the zone by then manually spreading its stringers apart. There is no time wasted in manipulating the slider all along the rows of scoops.

According to the invention, there is provided a sliding clasp fastener affixed to and in combination with an article, wherein the sliding clasp fastener includes a pair of stringer tapes which carry interlockable rows of scoops along their opposed longitudinal edges and which are attached to the edges of the article bounding an opening therein, the combination having an emergency opening zone which is located intermediate both ends of said rows of scoops and in which said rows of scoops are incapable of interlocking engagement when the sliding clasp fastener is closed, and a pair

of reinforcements of relatively rigid material fixedly arranged along and on the opposite sides of said emergency opening zone with spacings therefrom, each reinforcement being longer than said emergency opening zone and extending beyond both extremities thereof.

The pair of reinforcements should be effective to hold the sliding clasp fastener closed in spite of a high transverse pull which may be exerted thereon at or in the adjacency of its emergency opening zone via an article to which the fastener is attached. Such reinforcements can be affixed for example either to the edges of the article bounding an opening therein or to the stringer tapes. The emergency opening zone can be formed for example either by removing several scoops from each stringer tape or by deforming several scoops on one or both stringer tapes so as to be essentially incapable of interlocking engagement when the fastener is closed by the slider.

The invention will be described by way of examples with reference to the accompanying drawings in which like reference characters refer to like parts throughout, and wherein:

Figure 1 is a fragmentary plan view of a sliding clasp fastener as attached to the edges of an article bounding a closure opening therein, in which one of the article edges is shown partly broken away to reveal one of the reinforcements used in the emergency opening means of the fastener according to this invention;

Figure 2 is a transverse sectional view of the sliding clasp fastener taken along the plane of line II-II in Figure 1;

Figure 3 is a fragmentary perspective view of the sliding clasp fastener of Figure 1, the view being explanatory of the way the fastener is forced open in an emergency;

Figure 4 is a fragmentary plan view also explanatory of the way the sliding clasp fas-

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tener of Figure 1 is forced open in an emergency;

Figures 5A and 5B are fragmentary, schematic perspective views showing alternative forms of the reinforcements for use in the emergency opening means according to the invention; and

Figures 6A to 6E, inclusive, are fragmentary, schematic plan views showing various alternative forms of scoops which can be adopted to provide an emergency opening zone in this invention.

With particular reference to Figures 1 and 2 a sliding clasp fastener illustrated therein by way of a first preferred embodiment of this invention includes a pair of stringer tapes 10 carrying interlockable rows of fastener elements or scoops 11 of the usual discrete type along their opposed longitudinal edges. These stringer tapes 10 are shown attached to the respective opposed edges of an article 12 such as a tent or curtain by means of dual rows of stitches 13. The sliding clasp fastener is thus adapted to openably close the opening bounded by the opposed edges of the article 12.

Shown at A in Figure 1 is an emergency opening zone that is located intermediate both ends of the rows of scoops 11 and from which several scoops on each stringer tape 10 are absent. In this emergency opening zone, therefore, the two rows of scoops 11 are incapable of interlocking engagement when the sliding clasp fastener is closed by the usual slider, not shown, movable therealong. The capitals B and C in the drawing represent the remaining zones of the sliding clasp fastener where the scoops 11 interengage in the normal fashion upon movement of the unshown slider therealong in the fastener closing direction.

Since the emergency opening zone A in this particular embodiment of the invention is formed by the absence of several scoops on each stringer tape 10, the length of the zone should be such that the slider will not walk off the rows of scoops from that zone in the act of closing or opening the fastener. It is also desirable that a pair of edge beads 14 on the respective opposed edges of the stringer tapes 10 be of sufficient thickness and rigidity to constrain the slider to move therealong.

A pair of reinforcements 15 of relatively rigid material are fixedly arranged along, and on the opposite sides of, the emergency opening zone A with suitable spacings therefrom. The reinforcements 15 in this first embodiment are each shown to be in the shape of a rod, which in practice may take the form of piano wire. Each reinforcement 15 should be longer than the emergency opening zone A and should extend beyond both extremities of that zone into the neighboring zones B and C.

Also in this particular embodiment of the invention, the reinforcements 15 are sewn respectively into rearward folds 16 formed along the opposed edges of the article 12. For thus sewing the reinforcements 15 into the respective folds 16, the reinforcements may be inserted into the folds from slits 17 formed therein. After arranging the reinforcements in prescribed positions within the folds with respect to the emergency opening zone A, they may be restrained from displacement by stitches 18 formed at both ends of each reinforcement.

It is worth mentioning that at least one of the two rows of stitches 13 by which each stringer tape 10 is secured to the fold 16 along the corresponding edge of the article 12 should be located immediately on the outside of the reinforcement 15 (that is, opposite to the side on which the scoops 11 are located) or thereabouts. This is to make sure that a transverse pull exerted on the article 12 when the fastener is held closed is transmitted to the interengaged scoops 11 via the reinforcements 15 and stringer tapes 10. It is also important to note that the reinforcements 15 must be suitably spaced from the rows of scoops 11 to permit the scoop-carrying edges of the stringer tapes 10 to move apart from each other for disengagement of the scoops in emergencies, as will more fully appear from the following description.

In the use of the sliding clasp fastener set forth hereinbefore with reference to Figures 1 and 2, a high transverse pull may be accidentally exerted on the article 12 in the adjacency of the emergency opening zone A in the normal working conditions of the fastener, while the fastener is held closed. Were it not for the reinforcements 15, this transverse pull would act directly upon the emergency opening zone A thereby causing the rows of scoops 11 to disengage from the zone.

However, since the rigid reinforcements 15 on both sides of the emergency opening zone A extend into the neighboring zones B and C, the transverse pull on the article 12 will act, via the reinforcements, upon the zones B and C as well, where the scoops 11 on both stringer tapes 10 are securely interengaged. The sliding clasp fastener can thus be held closed in spite of the accidental transverse pull exerted on the article 12.

For opening the sliding clasp fastener in the event of an emergency, such for example as a fire or earthquake, a finger pressure may be applied to its emergency opening zone A in a direction normal to the plane of the fastener, as indicated by the arrow in Figure 3. Even though the rigid reinforcements 15 are arranged on both sides of the emergency opening zone A, the stringer tapes 10 are sufficiently flexible to yield to



the finger pressure and to move apart from each other, with their opposed edges curved arcuately as depicted in Figure 4.

As the scoops 11 of the zones B and C are partly disengaged by the initial finger pressure applied to the emergency opening zone A, the pair of stringer tapes 10 may then be manually forced apart to cause complete disengagement of the scoops of the zones B and C. It is possible in this manner to quickly open the fastener from its emergency opening zone, without need for pulling the slider in the fastener opening direction all along the rows of scoops.

Figures 5A and 5B illustrate different examples of reinforcements to be arranged along, and on the opposite sides of, the emergency opening zone A in accordance with the invention. While in the preceding embodiment of the invention the reinforcements 15 are sewn into the respective rearward folds 16 formed along the opposed edges of the article, such reinforcements can be directly affixed to the front and/or rear surfaces of the stringer tapes 10 within the scope of the invention. The shape and material of the reinforcements are also not limited to the specific examples set forth in conjunction with Figures 1 and 2, only if each reinforcement is sufficiently rigid to resist bending in the transverse direction (normal to the direction in which the rows of scoops 11 extend) in spite of the forces encountered in the normal use of the sliding clasp fastener.

Shown in Figure 5A is another example of reinforcements meeting such requirements. The illustrated reinforcements 15a are each rod-shaped, with a ridge extending throughout its length, and can be moulded of a synthetic resin or the like. These reinforcements are mounted directly upon the respective stringer tapes 10.

Reinforcements 15b shown in Figure 5B by way of an additional example are each in the shape of a strip of a synthetic resin or the like with a series of scallops on one of its faces. The scalloped reinforcements 15b, also mounted directly upon the respective stringer tapes 10, has the advantage that they do not impair the flexibility of the tapes in the direction normal to the tape plane.

The reinforcements 15a and 15b are both well calculated so as not to hamper the movement of the needle when the stringer tapes 10 are sewn onto the edges of a desired article. It should be noted that, in spite of the showing of the drawings, such reinforcements 15, 15a and 15b may not necessarily be arranged one on each side of the emergency opening zone A, but that two or more reinforcements can be disposed in parallelism on each side of the zone.

Figures 6A to 6E are all directed to possible modifications of the emergency opening

zone A which can be used in combination with the reinforcements 15, 15a or 15b according to the invention. In all these modifications shown, the emergency opening zone is formed not by removing several scoops from each stringer tape but by deforming several scoops on one or both stringer tapes so as to be incapable of interlocking engagement when the fastener is closed by the slider.

In Figure 6A, for example, the coupling heads of several scoops 11a of the usual coil-type continuous coupling element on each stringer tape 10 are fused into a rod-shaped portion 19 extending across the several scoops. The pair of opposed rod-shaped portions 19 thus formed, which may be spaced some distance from each other, are of course incapable of interengagement when the fastener is closed.

In Figure 6B several scoops 11b of the coil-type coupling element on each stringer tape 10 have the usual lateral protuberances, removed from, or not formed on, their coupling heads, the lateral protuberances on the other scoops being designated 20 in the drawing. Alternatively, the lateral protuberances of the several scoops 11b may be lessened in size to such an extent that the scoops will not substantially interlock upon closure of the fastener.

As illustrated in Figure 6C, the lateral protuberances can be removed from the coupling heads of several scoops 11c of the coil-type coupling element only on one of the stringer tapes 10.

In Figure 6D the spacings between several scoops 11d of the coil-type coupling element on each stringer tape 10 are made wider than the spacings between the scoops of other than the emergency opening zone A. Thus, when the fastener is closed by the slider, the scoops 11d of the emergency opening zone will interengage so loosely that the fastener is readily openable in an emergency in the manner previously explained in connection with Figures 3 and 4.

It will now be apparent that the concepts underlying all the preceding examples of the emergency opening zone A shown in Figures 6A to 6D are directly applicable to other injection-moulded synthetic-resin coupling elements or to metal-made elements, as represented by scoops 11e given in Figure 6E as an additional example.

The scoops 11a to 11e of Figures 6A to 6E have in common the advantage of producing little or no gap in the emergency opening zone A when the sliding clasp fastener is closed. All these deformed scoops are incapable of interlocking engagement in the emergency opening zone, as in the first described embodiment of the invention in which no scoops are present in the zone, so

that fasteners incorporating such scoops can be forced open in an emergency just like the fastener of the first embodiment.

5 It is believed that the advantages of the sliding clasp fastener with the improved emergency opening means according to the invention are apparent from the foregoing detailed description. While some preferred forms of the invention have been shown and described, however, it will be understood that changes may be made in the structures disclosed, without departing from the invention as sought to be defined in the following claims.

15 **WHAT WE CLAIM IS:-**

1. A sliding clasp fastener affixed to and in combination with an article, wherein the sliding clasp fastener includes a pair of stringer tapes which carry interlockable rows of scoops along their opposed longitudinal edges and which are attached to the edges of the article bounding an opening therein, the combination having an emergency opening zone which is located intermediate both ends of said rows of scoops and in which said rows of scoops are incapable of interlocking engagement when the sliding clasp fastener is closed, and a pair of reinforcements of relatively rigid material fixedly arranged along and on the opposite sides of said emergency opening zone with spacings therefrom, each reinforcement being longer than said emergency opening zone and extending beyond both extremities thereof.

2. A combination as claimed in claim 1, wherein said reinforcements are sewn into the respective edges of the article bounding the opening therein.

40 3. A combination as claimed in claim 1, wherein said reinforcements are directly

affixed to said stringer tapes respectively.

4. A combination as claimed in claim 1, wherein said emergency opening zone is formed by deforming several scoops on at least one of the stringer tapes so as to be substantially incapable of interlocking engagement with corresponding scoops when the sliding clasp fastener is closed.

5. A combination substantially as herein described with reference to and as illustrated in Figures 1 to 4 of the accompanying drawings.

6. A combination substantially as herein described with reference to and as illustrated in Figures 1 to 4 modified as in Figure 5A of the accompanying drawings.

7. A combination substantially as herein described with reference to and as illustrated in Figures 1 to 4 modified as in Figure 5B of the accompanying drawings.

8. A combination as claimed in claim 5, 6 or 7 modified substantially as described with reference to and as illustrated in Figure 6A of the accompanying drawings.

9. A combination as claimed in claim 5, 6 or 7 modified substantially as described with reference to and as illustrated in Figure 6B of the accompanying drawings.

10. A combination as claimed in claim 5, 6 or 7 modified substantially as described with reference to and as illustrated in Figure 6C of the accompanying drawings.

11. A combination as claimed in claim 5, 6 or 7 modified substantially as described with reference to and as illustrated in Figure 6D of the accompanying drawings.

12. A combination as claimed in claim 5, 6 or 7 modified substantially as described with reference to and as illustrated in Figure 6E of the accompanying drawings.

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FIG. 1

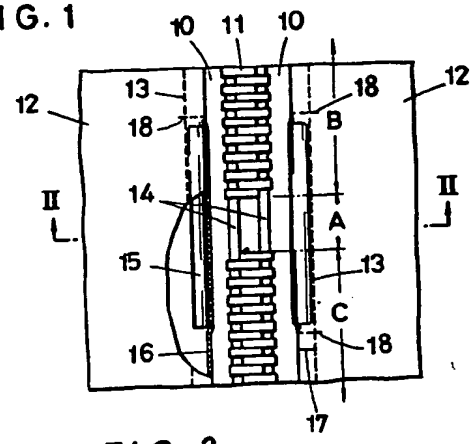


FIG. 2

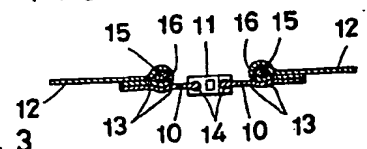


FIG. 3

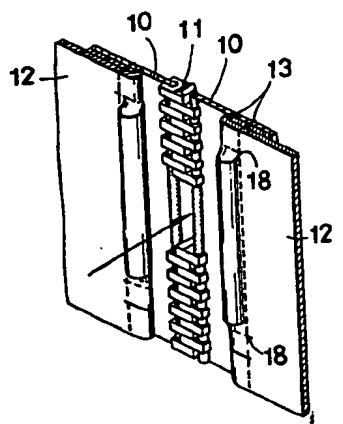


FIG. 4

